

Botanical Survey of the Angel Mounds Site

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The study, a preliminary report of which appeared in volume 51 of the *Proceedings of the Indiana Academy of Science*, resolved itself into two parts: a general taxonomic survey of the vascular plants of the region, and a detailed ecological study of the site of the old village wall.

I. General Taxonomic Survey.

The general taxonomic survey was begun early in the spring of 1941, and carried through the growing season of 1942. During the two seasons, 339 different species of vascular plants were collected and identified. Five additional species were identified to the genus only. Of the 339 species, 241 were new records for Vanderburgh county, and one a new record for Warrick county. Most of the plants were very common, reflecting the fact that Vanderburgh county has been neglected by plant collectors, but a few rare plants were found and previously reported (*Proc. Indiana Acad. Sci.*, 51:68, 1941). Many of the plants growing at the site were important in the economic botany of various Indian tribes, and it seems reasonable to suppose that they were used by the inhabitants of the site.

II. Study of the Wall Site.

The site of the wall was marked by a variation in plants which formed a strip extending across the fields. In an effort to discover an explanation for these differences, six transects ten feet wide and about 100 feet long were staked off across the wall site, and studied in detail over a two-year period with respect to plant distribution, pH of soil, soil nutrients, and elevation. At the end of the study, sections of two test areas were excavated.

A correlation between plant distribution, pH, and elevation was confirmed in all cases. During a two-year period, pH readings taken at different times of year, at different depths, and at different frequencies across the transects always gave similar curves, with a distinct drop in pH at the spot where the elevation and plant differences were greatest. Tests for potassium, phosphorous, and nitrates showed no corresponding curve. Plant distribution was carefully charted for the two growing seasons, and the results were always the same. When the pH falls to 5.00 or below, *Aster pilosus* is stunted in growth or absent, depending upon the degree of acidity. *Plantago lanceolata* is also intolerant of the more acid regions. *Plantago aristata*, *Rumex acetosella*, and *Danthonia spicata*, on the other hand, grow well with the pH below 5.00, and are not tolerant of the more alkaline soils.

Elevation readings, although the difference was often less than a foot, in each case showed the greatest elevation at the point of greatest acidity and greatest difference in plant growth.

A section parallel to a test transect was limed the second season with five pounds of air-slaked lime to each ten-foot block, resulting in accel-

erated growth of plants on the wall site, particularly marked in the case of a few plants of *Aster pilosus* growing there.

At the end of the second year, Mr. Glenn Black supervised the excavation of portions of two transects, and showed the center of the palisade trench to be where it was predicted on the basis of the above data; that is, where the elevation was greatest, pH lowest, and plant differences most striking.

Although the study strongly indicates that the peculiar plant distributions were due to acidity differences, it is not to be presumed that this was the sole cause. It is possible that toxic minerals were present, but the increased vigor of plants on the limed area suggests that if such substances were present, they were not as important as acidity in affecting the growth of the plants.

Dryness of soil on the wall site appears to be due to absence of plants and not the reverse. This conclusion is reached on comparison with artificially denuded areas. Growth of plants on artificially denuded areas emphasizes the peculiarity of growth on and along the site of the wall. In these other areas, either plants similar to the surrounding growth or rank weeds common to the area quickly make their appearance. If it were a question of soil moisture alone, we should get the same effect on the wall as on other bare areas. The results of liming also point away from soil moisture and towards acidity as the cause of plant differences. Also seedlings do not appear on the wall site even when the soil is moist in the spring.

It seems apparent that the wall must have been responsible for creating soil differences which exist to this day. Just how this was accomplished is open to conjecture. There is no doubt that we are faced with a problem of peculiar deposition. Over a period of years soil was washed down from the mud-plastered wall by rains, and so a deposit of clay with lime salts washed out of it was built up. The logs of which the wall was built probably decayed under conditions of poor aeration, and decay of organic materials under such conditions is a cause of soil acidity.

At present there seems to be no way to determine which of the possible explanations for the soil acidity, if any, is the correct one, or whether they were all contributing factors. They are set forth as thought-provoking possibilities, and are not intended as conclusive evidence of what may have happened.